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A NEW SEA STAR OF THE GENUS EVASTERIAS

BY

W. K. FISHER
Of the Hopkins Marine Station, Pacific Grove, California

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A NEW SEA STAR OF THE GENUS EVASTERIAS

By W. K. Fisher,
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Species of the genus *Evasterias* are confined to the intertidal zone and shallow water of the North Pacific, from the Okhotsk Sea to central California. The center of abundance is the region between southern Alaska and Puget Sound.

The genus differs from *Asterias* in having numerous actinal plates (each having one or two spines) arranged in from three to six longiseries, which alternate with longiseries of large actinal papulae; inferomarginal plates lateral rather than actinal in position.[1]

There are two very distinct species, *Evasterias troschelii* Stimpson and *E. echinosoma*, herein described. *Evasterias troschelii* is one of the most variable of sea stars, which is admitting a good deal. Study of a large number of specimens indicates the existence of three fairly distinct, intergrading formae each with numerous variations.

1. Forma *troschelii*, the type form, with very unequal abactinal spines not arranged in a well-defined reticulum. This includes *Asterias victoriana* Verrill, *Leptasterias macouni* Verrill (a six-rayed young), *Evasterias troschelii*, var. *rudis* Verrill, a fully grown or giant specimen. (Pribilof Islands to Puget Sound.)

2. Forma *alveolata* Verrill, very variable, but in general with coarse spines arranged in a reticulate pattern. This form is Stimpson's interpretation of Brandt's *Asterias epichlora*, a name applied by Verrill (1914) to a small, six-rayed *Leptasterias* of the Alaskan coast. I think that Stimpson was correct and that Verrill is mistaken. Brandt's type was five-rayed, not six; the form is sometimes green above, as the name implies. This form includes *Asterias brachiata* Perrier, 1875 (preoccupied); *Evasterias troschelii*, var. *alveolata* Verrill, var. *parvispina* Verrill, and the "typical form" cited and figured by Verrill in 1914.[2] (Unalaska to Carmel Bay, Calif.)

[1] Fisher, a Preliminary Synopsis of the Asteriidae, Ann. and Mag. Nat. Hist., ser. 9, vol. 12, 1923, p. 599.

[2] Shallow-water Starfishes of the North Pacific Coast, etc. Harriman Alaska series, vol. 14, p. 153, pl. 26, figs. 1 and 2.

3. Forma *acanthostoma* (Verrill). Intergrades with *alveolata;* typical specimens differ in having uniformly small abactinal spines which stand in single file on the irregular reticulum of the skeleton and divide the abactinal area into areolae; or are more grouped and scattered so that the reticulation is not so evident; superomarginal spines in combs or groups of three to five (single, or irregularly one and two in *alveolata*). *Evasterias acanthostoma* Verrill. (Unalaska to Puget Sound.)

EVASTERIAS ECHINOSOMA, new species

Diagnosis.—Size, large; rays five, long, tapering, stout, more or less swollen, with a very convex abactinal, and a subplane actinal surface. Differing from *E. troschelii* in having uniformly large, mostly subconical, well-spaced abactinal spines; marginal plates unusually high on side of ray, the superomarginals being abactinal in position and generally monacanthid; six (or five) series of actinal plates (generally monacanthid) of which either the upper row or the inferomarginals define the margin of the ray; adambulacral plates triplacanthid, or displacanthid and triplacanthid. Type: R=330 mm., r=51 mm., R=6.4 r; br=about 60 mm.

Description.—The abactinal surface is armed with rather widely spaced and nearly uniform robust spines, cylindrical at the base, the distal half conical, longitudinally sulcated, bluntly pointed, and in giant specimens with R 300 mm., about 2.5 mm. long by 1 to 1.5 mm. thick at the base. The distal part of the spine may be slightly swollen so as to appear subcapitate. The spines of the distal portion of the ray are round tipped, and by a shortening and rounding of the terminal conical portion a subglobose, striated tip results. A majority of spines are so formed in specimens from stations 3281 (2), 3291 (1), 3235 (1), none of which have R greater than 200 mm. In the specimen from station 2842 the spines are slenderer than in the type, tapering and pointed. The spines do not have a regular arrangement. An irregular carinal series is generally fairly well marked, the dorsolaterals standing typically singly (but sometimes in groups or lines of 2, 3, or even 4) on the chief nodes of the reticular skeleton. In some of the very large specimens there are a few very delicate terete spinelets, scarcely larger than the abactinal straight pedicellariae, scattered over the abactinal surface. In the specimens on which the spinelets are more or less grouped there is rather less uniformity in size, some being of distinctly secondary size. There is a broad and pretty definite supramarginal channel bounded abactinally by a very irregular row of dorsal spines which usually but not always stand closer together than on the rest of the dorsolateral region.

The superomarginal spines are similar in form to the abactinal spines (following the variation of the latter) and are generally slightly smaller. Typically they stand one to a plate, close together, forming a very well-defined series, characteristically high on the side of the ray, so that the proximal half, at least, and sometimes the whole ray, is bordered, when viewed from above, by the inferomarginals, or by the first series of actinal spines. This character is accentuated in small examples (R 110 mm.), in which the abactinal area is narrow. Interradially the superomarginal series extends half way to the center of the disk. Two or three spines occur on the plates of the proximal half of ray in specimens from stations 4796, 3235, and 3291 (1 each).

There is a wide intermarginal channel (2 or 2.5 times length of inferomarginal spines). Inferomarginal spines similar to superomarginals, but a little longer (3 or 4 mm. in giant specimens), sometimes one to a plate, sometimes two, or rather irregularly one and two proximally and one distally. The series bends upward interradially, and in some specimens is abactinal (or dorsolateral) in position.

In large specimens there are six series of spiniferous and one short series of spineless actinal plates at the base of the ray. There is considerable variation in the number of spines to the plate. All plates may be monacanthid. In this case there are eight regular, spaced longiseries of spines, of which two are marginal series abactinal in position (station 3282). The outer three or four series are sometimes regularly or irregularly diplacanthid and the inner two or three monacanthid; or the outer row may be monacanthid, the next two irregularly diplacanthid, and the remaining three, monacanthid (station 3281). In a specimen from station 2842 a considerable number of plates are triplacanthid. In large specimens the sixth or inner series of actinal spines extends one-third R measured from center of disk. The actinal spines become gradually a little longer, sometimes heavier and clavate, in passing from the outer toward the inner series. The details of the actinal spines are variable, as in other species. The tips may be compressed and subtruncate, sulcate, or tapered, blunt, or pointed. The smallest specimen (station 3650) with R 46 mm., has four series of actinal plates. The larger specimen from Kamchatka (station 4796) with R 265 mm. has but five series of actinal plates. Whether this is constant for large Asiatic examples can not be determined.

The actinal channels are typically well marked, even broad in some cases, so that the rows of spines are distinct and separated.

The adambulacral plates are triplacanthid and diplacanthid. In large examples most of the plates of the proximal half of the ray

are triplacanthid then irregularly diplacanthid and triplacanthid, and finally on the distal third of the ray mostly diplacanthid. The distribution of these numbers will, of course, vary in different individuals. In general the proportion of plates occupied by three spines increases with the size of the animal, the third spine being added on the outer side of the plate. The combs of alternate plates are advanced further into the furrow. The first three plates following the mouth plates are generally monacanthid; then three or four are diplacanthid, following which, after a few plates of three and two, the regular triplacanthid plates commence. The spines are slender, about as long as the innter actinals. The furrow members are slightly tapered; the others, a little stouter, varying from slightly tapered to cylindrical, or somewhat clavate, round tipped to bluntly pointed. The third, outer spine may be shorter than the other two. There are usually five pairs of united plates composing the adoral carina. The large Kamchatkan example is diplacanthid, and near the end of the ray, irregularly diplacanthid and monacanthid.

Actinostome very small. Mouth plates with two apical spines in nearly vertical series, the smaller at the mouth of the furrow, the other (about as long as the plate, and sometimes spatulate) almost directly above it (as viewed from the actinal side). The suboral spine, near outer end of plate, is about as long as first two or three adambulacrals.

The papulae have the distribution characteristic of the genus and are very abundant, especially abactinally, where, in alcoholic specimens, they appear to occupy all the space between the prominent circles of crossed pedicellariae surrounding the spines. The size of the areas increases with age; about eight or nine areas can be counted across ray at base, but the dorsolaterals are very irregular. There is a fairly regular supramarginal row. The intermarginal and actinal rows—eight in all—are typically regular and decrease in size toward the furrow.

There are two sorts of straight pedicellariae, larger and smaller; the larger, usually compressed ovate, wedge shaped, with the end broadly rounded and the tip of each jaw with two or three denticles, varies from abundant to relatively few on the abactinal surface; they are generally abundant on the intermarginal and actinal integument, and a few occur on the inferomarginal, actinal, adambulacral, and oral spines. They vary to lanceolate obtuse and lanceolate acute. In large specimens the abactinal measure about 0.9 to 1 mm., while the actinal interradial ones are 1.5 mm. long. Much smaller ones are present in variable numbers on the actinal, adambulacral, and oral spines, and are rather sparsely scattered along the furrow face of the adambulacral plates.

Small crossed pedicellariae are very abundant singly and in groups among the papulae; in a broad zone around the abactinal and marginal spines; and in half wreaths on the outer side of the actinal and adambulacral spines. The abactinal measure 0.27 to 0.3 mm., while the adambulacral measure 0.35 to 0.4 mm. (large specimens with R 270 mm. or more). Apparently there is a gradual increase in the number of crossed pedicellariae, especially the papular, with age.

Madreporic body large, subplane with a row of spinelets on the adcentral border; it is situated a little less than one-third r from center of disk.

Type.—Cat. No. E1237, U.S.N.M.

Type locality.—Station 3278, north of the end of Alaska Peninsula (56° 12′ 30″ N., 162° 13′ W.), 47 fathoms, fine gray sand; bottom temperature, 38.8° F.

Distribution.—Southern Bering Sea, from Bristol Bay to Unalaska; the coast of Asia from Avatka Bay, Kamchatka, to the Okhotsk Sea; 11 to 48 fathoms, fine sand, mud, pebbles, stones; temperature range, 38° to 41.2° F.

Specimens of Evasterias echinosoma examined

Station	Locality	Depth	Nature of bottom	Bottom temperature	Number of specimens
2842	Off north coast Unalaska	41	Pebbles	41	1
3235	Bristol Bay, Alaska	11	Black stones		1
3241	do	14	Black mud	38	1
3278	North of end of Alaska Peninsula, 56° 12′ 30″ N., 162° 13′ W.	47	Fine gray sand	38.8	2
3281	do	36	Gray sand		2
3282	do	53	Fine sand, green mud	38.2	1
3285	do	35	Gray sand	41	1
3291	Mouth of Bristol Bay, near Alaskan Peninsula, 58° 58′ 30″ N., 159° 11′ W.	26	Black sand	41.2	2
3650	Okhotsk Sea (to westward of Robben Island).	28	Brown mud, sand		1
4796	Avatka Bay, Kamchatka, 52° 47′ N., 158° 43′ E.	48	Sand, pebbles		1

EXPLANATION OF PLATES

PLATE I

Evasterias echinosoma, type, abactinal surface.

PLATE II

Evasterias echinosoma, type, actinal surface.

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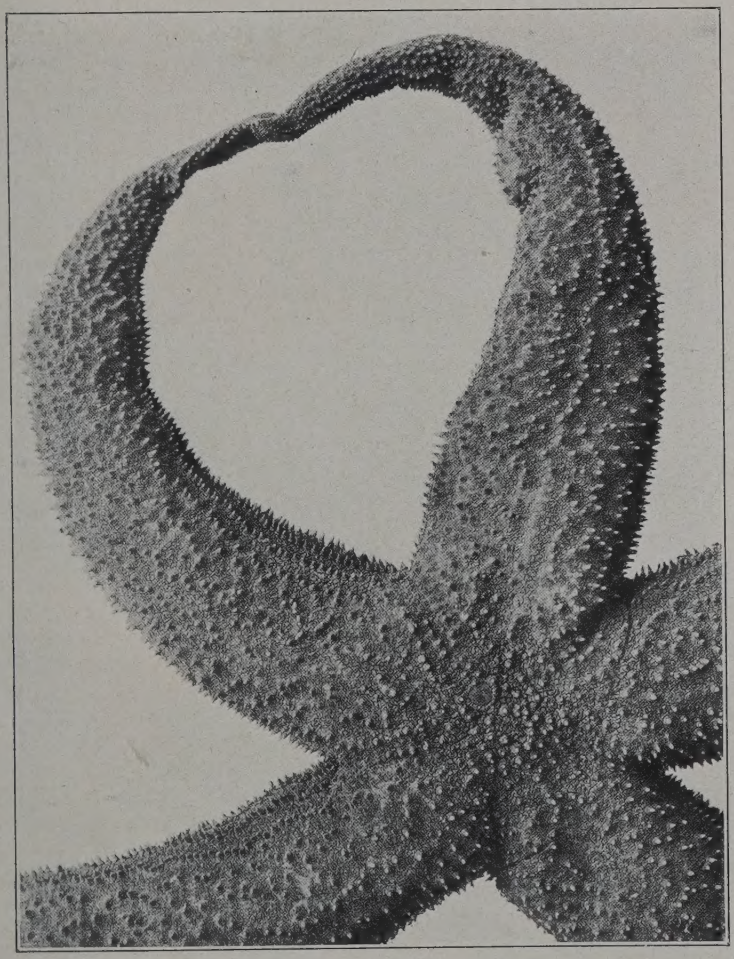
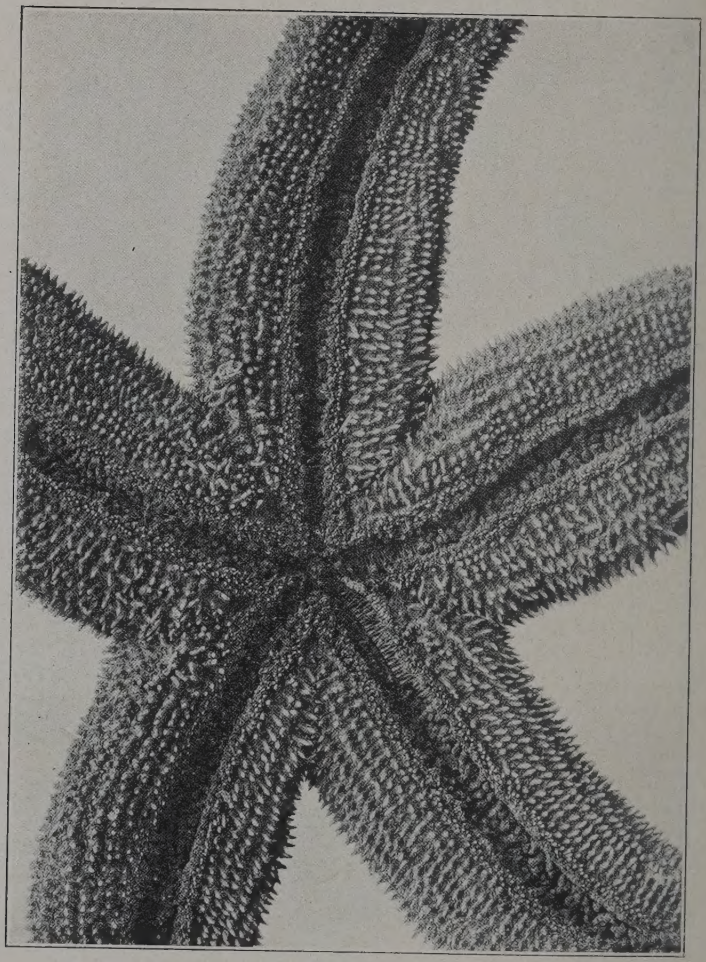


ABACTINAL SURFACE OF EVASTERIAS ECHINOSOMA, TYPE

FOR DESCRIPTION OF PLATE SEE PAGE 5



ACTINAL SURFACE OF EVASTERIAS ECHINOSOMA, TYPE

FOR DESCRIPTION OF PLATE SEE PAGE 5